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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/493,080	01/28/2000	Ryoichi Kajiwara	503.38097x00	1760

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EXAMINER

CHAMBLISS, ALONZO

ART UNIT	PAPER NUMBER
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2827

DATE MAILED: 11/12/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/493,080

Applicant(s)

KAJIWARA ET AL.

Examiner

Alonzo Chambliss

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 1-12, 14-18 and 21-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13, 19 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 August 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>3</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The substitute specification filed on 8/18/00 has been entered and made of record in Paper No. 4.
2. Pre-amendment A filed on 8/18/02 filed on 8/18/00 has been fully considered and made of record in Paper No. 5.

Election/Restrictions

3. Applicant's election without traverse of species claims 13, 19, and 20 in Paper No. 9 is acknowledged.

Claims 1-12, 14-18, and 21-24 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species claims, there being no allowable generic or linking claim.

Priority

4. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

5. The information disclosure statement (IDS) submitted on 1/28/00 in Paper No. 3 was filed before the mailing date of the non-final rejection on 11/6/02. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

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Drawings

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: Au ball bumps 110 on page 42, line 13, mounting lead 42 on page 60, line 8. Also, the drawings are objected to because they include the following reference sign(s) not mentioned in the description: 5, 18, 23, 27, 28, 34, 37, 38, 44, 53, 56-58, 63, 64, 75, (4) in Fig. 9, 81-89, 94, 96, 104, 133, 134, 137, 142, 148, 151, 157, 184b, 254, 255, 259b, 260a, 260b, 263-266, 270, 273, 274, 296, 311-313, 319, 320a, 320b, 321a, 321b, 321c, and 322. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

7. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: " SEMICONDUCTOR DEVICE PACKAGE WITH DECREASE ELECTRICAL RESISTANCE ".

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

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9. Claims 13, 19, and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. In claim 13, the phrase "said metallic is composed by bonding to each other a precious metal layer provided at the bonding front plane of said second electrode with a precious metal layer provided at the bonding front plane of the said second metallic member" is confusing, since the language is confusing because how the metallic is bonded **to each other**. Furthermore, it is not clear if there are two different precious metal layers one on the front plane of the electrode and a second precious metal layer on the bonding front plane of the second metallic member. Therefore, the claim is vague and indefinite.

11. In claim 13, the phrase "a semiconductor element which comprises a first electrode provided on a front plane of the semiconductor substrate and a second electrode provided on a rear plane of the semiconductor substrate" is vague and indefinite, since it is not clear how the semiconductor element contains an electrode on the front and rear planes of a semiconductor substrate. Especially, when applicant's figures all show a chip comprising an electrode on the front and rear planes.

12. Claim 19 recites the limitation "an aluminum film" in line 10. There is insufficient antecedent basis for this limitation in the claim.

13. Claim 19, the phrase "an aluminum film of more than 80% in area of an Au/Al bonding region is made all of an Au/Al alloy layer in the thickness direction" is

confusing since it is not clear if the applicant is referring to the bonding region that comprises the Au bump and the aluminum pad.

14. In claim 20, the phrase " a third metallic member connected to a control electrode " is vague and indefinite, since it is not clear where the third metallic member is located relative to the chip or first and second metallic members. Also, it is not clear where the control electrode is relative to the chip.

15. In claim 20, the phrase " plural Au bumps are formed on the Al electrode film in a metallically bonded condition " is vague and indefinite, since it is not clear if the bumps are connected to both the current and control electrodes or just to the one of them.

16. Claim 20 recites the limitation " said metallic member " in line 15. There is insufficient antecedent basis for this limitation in the claim.

17. Claim 20 recites the limitation " said metallic member " in line 16. There is insufficient antecedent basis for this limitation in the claim.

18. In claim 20, the phrase " in the plane of chip projection " is vague and indefinite, since it is not clear where the chip projection is.

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

20. Claims 13 and 19, insofar as being definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kasem et al. (U.S. 6,249,041) in view of Nakamura (JP 1-266752).

With respect to Claims 13 and 19, Kasem discloses a semiconductor substrate connect to a chip by a lead frame (see col. 2 lines 1-6). Kasem discloses a semiconductor element 12 (i.e. chip) attached to a first metallic member 26 (i.e. lead) and a second metallic member 32 (i.e. lead) by solder bumps in an alternative embodiment (see col. 4 lines 9-44). The examiner is viewing the semiconductor substrate with first and second electrodes as a chip with first and second electrodes. Kasem does not explicitly disclose a first electrode provided on a front and rear planes of the chip. However, since solder bumps are used in the alternate embodiment on the front and rear planes. One skilled in the art would readily recognize that electrodes (i.e. contact pads) would be present to provide the electrical connection between the chip, Al pad 2 and the solder bumps 3 (i.e. metallic layer containing precious metal (Ag)) as

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evidence by Nakamura (JP 1-266752). Therefore, it would have been obvious to one skilled in the art to incorporate contact pads on the front and rear planes of the chip, since contact pads are used with solder bumps when providing electrical signals to the chip as taught by Nakamura. Thus, the first and second metallic members 26, 32 would be connected to first and second electrodes, respectively and the aluminum film (i.e. Al pad) is more than 80% in the area of the bonding region including the aluminum film and Au bump so that all of the bonding region is made all of an Au/Al alloy layer in the thickness direction. Kasem-Nakamura both fail to disclose wherein the metallic layer is bonded to a precious metal layer provided at the bonding front plane of the second electrode with a precious metal layer provided at the bonding front plane of the second metallic member. However, Bonshihara discloses wherein the metallic layer 7 (i.e. solder bump) is bonded to a precious metal layer 3 (i.e. Pd, Au, or Ag) provided at the bonding front plane of the metallic member 1 (see English abstract and Fig. 1). Therefore, it would have been obvious to incorporate the precious metal layer on the bonding front plane of the metallic member, since the precious metal layer would prevent the short circuit of the leads and suppress the generation of whisker on the Sn as taught by Bonshihara.

The prior art made of record and not relied upon is cited primarily to show the product of the instant invention.


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Conclusion

21. Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703) 306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956.

AC/November 7, 2002

A handwritten signature in black ink, appearing to read "Alonzo Chambliss". The signature is fluid and cursive, with the first name "Alonzo" and last name "Chambliss" clearly distinguishable.

Alonzo Chambliss
Examiner
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